REMARKS

This Preliminary Amendment cancels, without prejudice, claims 1 to 11 in the underlying PCT Application No. PCT/EP2004/009839 and adds new claims 12 to 19. The new claims, inter alia, conform the claims to United States Patent and Trademark Office rules and does not add any new matter to the application.

In accordance with 37 C.F.R. § 1.125(b), the Substitute Specification (including the Abstract) contains no new matter. The amendments reflected in the Substitute Specification (including Abstract) are to conform the Specification and Abstract to United States Patent and Trademark Office rules or to correct informalities. As required by 37 C.F.R. §§ 1.121(b)(3)(ii) and 1.125(c), a Marked-Up Version of the Substitute Specification comparing the Specification of record and the Substitute Specification also accompanies this Preliminary Amendment. Approval and entry of the Substitute Specification (including Abstract) are respectfully requested.

The underlying PCT Application No. PCT/EP2004/009839 includes an International Search Report, dated December 17, 2004, a copy of which is included. The Search Report includes a list of documents that were considered by the Examiner in the underlying PCT application.

It is respectfully submitted that the subject matter of the present application is new, non-obvious and useful. Prompt consideration and allowance of the application are respectfully requested.

Respectfully submitted,

Dated: May 1, 2006 By: _____

Clifford A. Ulrich
Reg. No. 42,194

KENYON & KENYON LLP
One Broadway
New York, New York 10004
(212) 425-7200
CUSTOMER NO. 26646

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COAXIAL CABLE AND METHOD FOR ITS MANUFACTURE

FIELD OF THE INVENTION

The present invention relates to a coaxial cable, ~~particularly~~ **e.g.,** for the shielded transmission of high-frequency signals, ~~as defined in Claim 1,~~ and a method for manufacturing such a coaxial cable ~~as defined in Claim 8~~.

BACKGROUND INFORMATION

Coaxial cables are often used for transmitting high-frequency antenna signals in motor vehicles and are mostly used in large quantities in this application. A simple construction and a simple preparation are **considered to be** important factors for the cost-effective provision of corresponding coaxial cables.

Frequently, plug connectors are installed at the ends of the cable. In this connection, normally a strain relief must be provided, which protects the electrically effective contacts between the plug connector components and the wires against excessive mechanical tensile loads. For this purpose, crimp connections are frequently used, for example.

[[EP]] **European Published Patent Application No.** 0 118 168 [[A1]] describes a plug connector for a multipole shielded cable, in which a sleeve for establishing contact with a braided shield is pushed into the interior of the tube-shaped braided shield. For mechanical fastening or for the purpose of strain relief, a crimp connection is produced by using another separate outer sleeve.

U.S. **Patent No.** 4,131,332 describes a plug connector for a monopole coaxial cable, in which the shield in the form of a metal braid is also contacted on its inner side by a sleeve. Another sleeve is situated on the outside of the shield, which

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is to ensure a mechanical strain relief of the contact point by a crimp connection.

~~The previously known~~ **Conventional** cables **may** have, among other things, the disadvantage that they are comparatively expensive to produce and are made up of relatively many component parts.

SUMMARY

~~The~~ **Example embodiments of the** present invention ~~is thus based on the objective of providing~~ **may provide** a coaxial cable, which ~~can~~ **may** be produced at a low manufacturing expenditure, and which ~~exhibits~~ **may exhibit** a high quality and robustness. ~~The present invention also provides a~~ **A** cost-effective method for manufacturing and preparing such a coaxial cable **may also be provided**.

~~This objective is achieved according to the present invention by the features of Claim 1 and Claim 8, respectively.~~

According to **an example embodiment of** the present invention, a contact sleeve is pushed or inserted between a shield and a dielectric when attaching a plug connector that forms one end of a coaxial cable. For this purpose, the contact sleeve is situated [[in]] such ~~a way~~ that, in one segment, ~~on the one hand~~ it encloses the dielectric and ~~one the other hand~~ is enclosed by the shield. For the purpose of strain relief, an extrusion coating is performed. In this manner, it is possible to do without a crimp connection or other additional measures of strain relief between the shield and the contact sleeve.

~~In a preferred refinement of the present invention, the~~ **The** outer contour of the extrusion coating ~~exhibits~~ **may exhibit** different distances with respect to a core of the coaxial cable such that forces may be applied in a form-locking manner

via this outer contour onto the housing of a secondary locking mechanism.

In the following, the term enclosed ~~is~~ **should** not be understood ~~in such a way~~ **to require** that a layer which encloses another layer in the cable buildup necessarily touches the other layer. Rather, between two layers, one of which encloses the other, an intermediate layer may also be situated.

In the following, plug connectors ~~are to~~ **should** be understood as electrical couplings, which may take the form of plugs as well as sockets.

~~Advantageous developments of the present invention are found in the dependent claims.~~

According to an example embodiment of the present invention, a monopole coaxial cable includes a core; a dielectric enclosing the core; an electrically conductive shield enclosing the dielectric, the shield including a metal braid and an electrically conductive foil; a jacket enclosing the shield; and a plug connector including a contact sleeve, a segment of the sleeve electrically conductively contacting the shield and including a circumferential cutting edge. The sleeve is arranged so that the segment encloses the dielectric and is enclosed by the shield, an inner surface of the segment slid onto an outer surface of the dielectric to widen the jacket in a region of the segment, the cutting edge arranged between the dielectric and the foil. The sleeve is mechanically connected to the jacket by an extrusion coat of an insulating material, the extrusion coat arranged as a strain relief between the segment and the shield.

According to an example embodiment of the present invention, a method for manufacturing a monopole coaxial cable including a dielectric, a shield that includes a metal braid and an electrically conductive foil, and a jacket surrounding the shield, and including a plug connector arranged at one end of the coaxial cable, includes: inserting a contact sleeve, including a segment having a circumferential cutting edge, in an axially parallel direction between the foil and the dielectric, an inner surface of the segment sliding on an outer surface of the dielectric to widen the jacket in a region of the segment, an outside of the segment in a region of the cutting edge sliding along the foil, the segment enclosing the dielectric and enclosed by the shield, the segment electrically contacting the shield; and extrusion coating the jacket and a portion of the sleeve with an insulating material to fix the sleeve relative to the shield as a strain relief.

Further details and ~~advantages~~ **aspects** of ~~the coaxial cable according to~~ **example embodiments of** the present invention ~~and of the corresponding manufacturing method~~ are ~~derived from~~ **described in more detail below in** the following description ~~of an exemplary embodiment~~ with reference to the ~~enclosed figures~~ **appended Figures**.

~~The figures show:~~

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 **is** a longitudinal ~~section~~ **cross-sectional** view of a coaxial cable in a first manufacturing step[[,]].

Figure 2 **is** a longitudinal ~~section~~ **cross-sectional** view of the coaxial cable in a second manufacturing step[[,]].

Figure 3a **is** a longitudinal ~~section~~ **cross-sectional** view of the finished coaxial cable[[,]].

Figure 3b **is** a front view of the finished coaxial cable.

DETAILED DESCRIPTION

Figure 1 ~~shows~~ **is** a longitudinal ~~section~~ **cross-sectional** view of a coaxial cable at the beginning of manufacture. The monopole coaxial cable has a core 1, which ~~is made up of~~ **includes** an inner lead 1.1 and an inner contact 1.2. Inner lead 1.1 ~~in turn is made up of~~ **includes** seven wires and is enclosed by an electrically nonconductive dielectric 2. This dielectric 2 ~~in turn~~ is enclosed by a shield 3, two-layer shield 3 including an electrically conductive foil 3.1, made of aluminum in the exemplary embodiment ~~presented~~ **illustrated** and a metal braid 3.2. These two layers of shield 3 are enclosed by a jacket 4, which represents at the same time the outer layer of the coaxial cable and is made of a PVC-based material. Prior to the attachment of a plug connector, shield 3 and jacket 4 are cut to length [[in]] such ~~a way~~ that dielectric 2 protrudes with respect to shield 3 and jacket 4. Furthermore, inner lead 1.1 protrudes from dielectric 2.

First, a mechanical and electrical contact is established between inner contact 1.2 and protruding inner lead 1.1 using a crimp connection. ~~On account of~~ **Due to the nature of** the ~~sectional view~~ **cross-sectional views**, ~~the~~ plastically deformed holding arms of inner contact 1.2 which partially embrace inner lead 1.1 are not visible ~~in the figures~~.

The plug connector, **e.g.,** a socket in the exemplary embodiment ~~shown~~ **illustrated**, includes a one-piece electrically conductive contact sleeve 5 made of metal, which is made, among other things, of an essentially hollow cylindrical segment 5.1, the outer surface 5.3 of which ~~was~~ **is** roughened by placing prick-punched points. Alternatively, roughening may also be performed by notching, ribbing or knurling**, etc**.

Furthermore, contact sleeve 5 has a widened subsection, into which a plug may be inserted following assembly. An insulator 5.2 made of plastic is located within the widened subsection. The wall thickness of contact sleeve 5 decreases toward the end that ~~lies~~ **is located** across from the widened subsection. This conical form, which is achieved by a beveled turning of the outer surface of the corresponding end of contact sleeve 5, results there ~~quasi~~ **substantially** in a ring-shaped circumferential cutting edge.

In the course of the assembly or the preparation of the coaxial cable, contact sleeve 5 is slid onto the protruding dielectric 2. For this purpose, the inner diameter of contact sleeve 5 is dimensioned in the corresponding contact area [[in]] such ~~a way~~ that contact sleeve 5 ~~can~~ **may** be shifted radially without play on dielectric 2 in the axially parallel direction X.

Subsequently, contact sleeve 5 is pushed in or inserted in the axially parallel direction X between shield 3 and dielectric 2. In the process, the inner surface of the first segment 5.1 of contact sleeve 5 slides on the outer surface of dielectric 2 such that dielectric 2 acts as a guide for sliding contact sleeve 5. The outside of segment 5.1 of contact sleeve 5 slides along foil 3.1, foil 3.1 being partially pushed together as a consequence of the shearing forces produced.

Metal braid 3.2 and jacket 4 are slightly flared in the respective region. This deformation produces radially directed forces that press shield 3 against contact sleeve 5 such that foil 3.1 or metal braid 3.2 securely contact contact sleeve 5 in an electrically conductive manner. Furthermore, the roughened areas or prick-punched points of the outer surface of segment 5.1 of contact sleeve 5 achieves a higher holding or pull-off force of contact sleeve 5.

The use of smooth foil 3.1 as a component of shield 3 ~~at this point has the advantage of allowing~~ **may provide** for a convenient and simple insertion of contact sleeve 5 with respect to shield 3. Foil 3.1, however, ~~has~~ **may provide** advantages not only with respect to assembly, but is also provided in the cable structure to act as an additional shield attenuation in the operation of the coaxial cable.

The measures described above, ~~particularly~~ **e.g.,** the protrusion of dielectric 2 and the use of foil 3.1 as contact layer with respect to contact sleeve 5, **may** simplify assembly and **may** significantly reduce assembly time.

Following the insertion of contact sleeve 5 between shield 3 and dielectric 2, contact sleeve 5, ~~according to~~ **as illustrated in** Figure 2, thus ~~on the one hand~~ encloses dielectric 2 in a segment 5.1 while ~~on the other hand~~ being enclosed by shield 3. In this exemplary embodiment, contact sleeve 5 contacts both metal braid 3.2 as well as foil 3.1. ~~At the same time~~ **In addition**, sliding contact sleeve 5 in the X direction also inserts inner contact 1.2 into the central bore hole of insulator 5.2.

In the next manufacturing step, an injection molding process is used to apply an insulating material, in the ~~shown~~ **illustrated** exemplary embodiment, a fiberglass-reinforced PP material, as extrusion coat 6 around jacket 4 and contact sleeve 5. In the process, extrusion coat 6 adheres excellently to contact sleeve 5 made of metal and jacket 4 which, as already described, is based on a PVC material. After cooling extrusion coat 6, a very good mechanical bond of the extrusion-coated parts ~~has thus been~~ **may be** achieved such that extrusion coat 6 acts as a strain relief of the contact between segment 5.1 and shield 3 or that contact sleeve 5 is

fixed relative to shield 3 in the sense of a strain relief. For this reason it is not **considered to be** necessary to provide any other measure or device for strain relief. ~~In particular~~ **For example**, a crimp connection ~~can~~ **may** be dispensed with in this location, which **may** markedly ~~decreases~~ **decrease** the assembly time and at the same time ~~reduces~~ **may reduce** the number of the parts of the coaxial cable, which **may** significantly ~~reduces~~ **reduce** the total expenditure for manufacturing a coaxial cable having a plug connector.

Extrusion coat 6 is geometrically designed [[in]] such ~~a way~~ that ribs 6.1 ~~running~~ **extending** around the outside are provided. The outer contour of extrusion coat 6 accordingly has in places offset in the axially parallel direction X different distances r, R with respect to inner lead 1.1 or to core 1. In the ~~shown~~ **illustrated** exemplary embodiment, extrusion coat 6 acts not only as a strain-relief element, but also for receiving a housing. Such a housing is used in order to keep a connection of two plug connectors securely together. For this purpose, axially parallel forces (parallel with respect to X) ~~must~~ **should** be able to be introduced into the respective cables. These forces are transmitted by keyed connection between a housing of a secondary locking mechanism ~~not shown in the figures~~ and extrusion coat 6. Ribs 6.1 are thus used for the form-locking transmission of axially parallel forces, the connection between the housing and the coaxial cable being torsion-free.

Such a coaxial cable having a plug connector [[is]] **may be** particularly suited for use in motor vehicles for transmitting high-frequency signals such as antenna signals, for example, in the range of 4 GHz. Due to the construction, ~~particularly~~ **e.g.,** due to the sealing and mechanically stress-resistant extrusion coating, the coaxial cables ~~according to the present invention are~~ **may be** especially robust and of high quality.

~~Incidentally,~~ **It should be understood that example embodiments of** the present invention [[is]] **are** not limited to coaxial cables whose plug connectors are oriented in extension of core 1 or along axis X, but it also ~~includes~~ **include** coaxial cables having an angled plug connector.

ABSTRACT

In a method for producing a concentric coaxial cable and a corresponding coaxial cable, the coaxial cable includes a core, a dielectric enclosing the core, an electroconducting shield enclosing the dielectric, a jacket enclosing the shield, and a connector. The connector includes a contact sleeve which is contacted in a section with the shield in an electroconducting manner. The contact sleeve is located to enclose in the section the dielectric while being enclosed by the shield. The contact sleeve is mechanically linked with the jacket of the coaxial cable by an extrusion coating so that the extrusion coating serves to relieve the strain on the contact area of the subsection with the shield.